

CLAIMS:

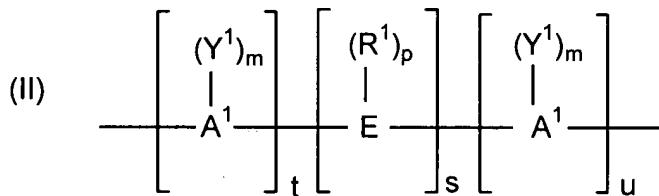
1. A composition comprising (i) at least one polycarbonate; (ii) optionally, at least one additional thermoplastic resin different from polycarbonate; and (iii) at least one rubber modified thermoplastic resin comprising a discontinuous elastomeric phase dispersed in a rigid thermoplastic phase, wherein at least a portion of the rigid thermoplastic phase is grafted to the elastomeric phase, and wherein the rigid thermoplastic phase comprises structural units derived from at least one vinyl aromatic monomer, at least one monoethylenically unsaturated nitrile monomer, and at least one monomer selected from the group consisting of (C₁-C₁₂)alkyl- and aryl-(meth)acrylate monomers.

2. The composition of claim 1 wherein the polycarbonate comprises structural units derived from at least one dihydroxy aromatic hydrocarbon represented by the formula (I):

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wherein D is a divalent aromatic radical with the structure of formula (II):



wherein A¹ is selected from the group consisting of an aromatic group, phenylene, biphenylene and naphthylene;

E is selected from the group consisting of alkylene, alkylidene, methylene, ethylene, ethylidene, propylene, propylidene, isopropylidene, butylene, butylidene, isobutylidene, amylene, amyldene, isoamylidene, a cycloaliphatic group, cyclopentylidene, cyclohexylidene, 3,3,5-trimethylcyclohexylidene, methylcyclohexylidene, 2-[2.2.1]-bicycloheptylidene, neopentylidene, cyclopentadecylidene, cyclododecylidene, adamantylidene; a sulfur-containing linkage, sulfide, sulfoxide, sulfone; a phosphorus-containing linkage, phosphinyl, phosphonyl; an ether linkage; a carbonyl group; a tertiary nitrogen group; a silicon-containing linkage, silane, siloxy; and two or more alkylene or alkylidene groups connected by a moiety different from alkylene or alkylidene and selected from the group consisting of an aromatic linkage; a tertiary nitrogen linkage; an ether linkage; a

carbonyl linkage; a silicon-containing linkage, silane, siloxy; a sulfur-containing linkage, sulfide, sulfoxide, sulfone; a phosphorus-containing linkage, phosphinyl and phosphonyl;

R^1 independently at each occurrence is selected from the group consisting of a monovalent hydrocarbon group, alkenyl, allyl, alkyl, aryl, aralkyl, alkaryl, cycloalkyl, a halogen-substituted monovalent hydrocarbon group, a fluoro-substituted monovalent hydrocarbon group, a chloro-substituted monovalent hydrocarbon group, dichloroalkylidene, and gem-dichloroalkylidene,

Y^1 independently at each occurrence is selected from the group consisting of an inorganic atom, halogen, fluorine, bromine, chlorine, iodine; an inorganic group containing more than one inorganic atom, nitro; an organic group, a monovalent hydrocarbon group, alkenyl, allyl, alkyl, C_1-C_6 alkyl, aryl, aralkyl, alkaryl, cycloalkyl, and an oxy group, OR^2 wherein R^2 is a monovalent hydrocarbon group selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl;

"m" represents any integer from and including zero through the number of replaceable hydrogens on A¹ available for substitution;

“p” represents an integer from and including zero through the number of replaceable hydrogens on E available for substitution;

“t” represents an integer equal to at least one;

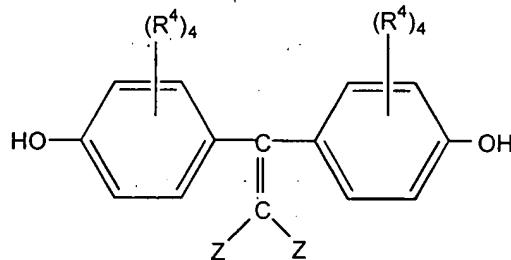
“s” represents an integer equal to either zero or one; and

“u” represents any integer including zero.

3. The composition of claim 1 wherein the polycarbonate comprises structural units derived from at least one dihydroxy aromatic hydrocarbon selected from the group consisting of bis(4-hydroxyphenyl)sulfide, bis(4-hydroxyphenyl)ether, bis(4-hydroxyphenyl)sulfone, bis(4-hydroxyphenyl)sulfoxide, 1,4-dihydroxybenzene, 4,4'-oxydiphenol, 2,2-bis(4-hydroxyphenyl)hexafluoropropane, 4,4'-(3,3,5-trimethylcyclohexylidene)diphenol; 4,4'-bis(3,5-dimethyl)diphenol, 1,1-bis(4-hydroxy-3-methylphenyl)cyclohexane; 4,4-bis(4-hydroxyphenyl)heptane; 2,4'-dihydroxydiphenylmethane; bis(2-hydroxyphenyl)methane; bis(4-hydroxyphenyl)methane; bis(4-hydroxy-5-nitrophenyl)methane; bis(4-hydroxy-2,6-dimethyl-3-methoxyphenyl)methane; 1,1-bis(4-hydroxyphenyl)ethane; 1,2-bis(4-hydroxyphenyl)ethane; 1,1-bis(4-hydroxy-2-chlorophenyl)ethane; 2,2-bis(3-phenyl-4-hydroxyphenyl)propane; 2,2-bis(4-hydroxy-3-methylphenyl)propane; 2,2-bis(4-hydroxy-3-ethylphenyl)propane; 2,2-bis(4-hydroxy-3-isopropylphenyl)propane; 2,2-bis(4-hydroxy-3,5-dimethylphenyl)propane; 3,5,3',5'-tetrachloro-4,4'-dihydroxyphenyl)propane; bis(4-hydroxyphenyl)cyclohexylmethane; 2,2-bis(4-

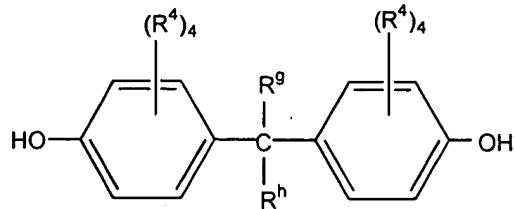
hydroxyphenyl)-1-phenylpropane; 2,4'-dihydroxyphenyl sulfone; dihydroxy naphthalene; 2,6-dihydroxy naphthalene; hydroquinone; resorcinol; C₁₋₃ alkyl-substituted resorcinols; methyl resorcinol, catechol, 1,4-dihydroxy-3-methylbenzene; 2,2-bis(4-hydroxyphenyl)butane; 2,2-bis(4-hydroxyphenyl)-2-methylbutane; 1,1-bis(4-hydroxyphenyl)cyclohexane; 4,4'-dihydroxydiphenyl; 2-(3-methyl-4-hydroxyphenyl-2-(4-hydroxyphenyl)propane; 2-(3,5-dimethyl-4-hydroxyphenyl)-2-(4-hydroxyphenyl)propane; 2-(3-methyl-4-hydroxyphenyl)-2-(3,5-dimethyl-4-hydroxyphenyl)propane; bis(3,5-dimethylphenyl-4-hydroxyphenyl)methane; 1,1-bis(3,5-dimethylphenyl-4-hydroxyphenyl)ethane; 2,2-bis(3,5-dimethylphenyl-4-hydroxyphenyl)propane; 2,4-bis(3,5-dimethylphenyl-4-hydroxyphenyl)-2-methylbutane; 3,3-bis(3,5-dimethylphenyl-4-hydroxyphenyl)pentane; 1,1-bis(3,5-dimethylphenyl-4-hydroxyphenyl)cyclopentane; 1,1-bis(3,5-dimethylphenyl-4-hydroxyphenyl)cyclohexane; bis(3,5-dimethyl-4-hydroxyphenyl) sulfoxide, bis(3,5-dimethyl-4-hydroxyphenyl) sulfone, bis(3,5-dimethylphenyl-4-hydroxyphenyl)sulfide; 3-(4-hydroxyphenyl)-1,1,3-trimethylindan-5-ol; 1-(4-hydroxyphenyl)-1,3,3-trimethylindan-5-ol; 2,2,2',2'-tetrahydro-3,3,3',3'-tetramethyl-1,1'-spirobi[1H-indene]-6,6'-diol and mixtures comprising at least one of the foregoing dihydroxy-aromatic compounds.

4. The composition of claim 1 wherein the polycarbonate comprises structural units derived from at least one dihydroxy aromatic hydrocarbon represented by the formula:



where independently each R⁴ is hydrogen, chlorine, bromine or a C₁₋₃₀ monovalent hydrocarbon or hydrocarbonoxy group, each Z is hydrogen, chlorine or bromine, subject to the provision that at least one Z is chlorine or bromine.

5. The composition of claim 1 wherein the polycarbonate comprises structural units derived from at least one dihydroxy aromatic hydrocarbon represented by the formula:



where independently each R⁴ is hydrogen, chlorine, bromine or a C₁₋₃₀ monovalent hydrocarbon or hydrocarbonoxy group, and independently R^g and R^h are hydrogen or a C₁₋₃₀ hydrocarbon group.

6. The composition of claim 5 wherein the dihydroxy aromatic hydrocarbon comprises bisphenol A.

7. The composition of claim 1 wherein the polycarbonate has a weight average molecular weight in the range of between about 18,000 and about 40,000 g/mol, as determined versus polystyrene standards.

8. The composition of claim 1 wherein the polycarbonate comprises a mixture of at least two polycarbonates of different weight average molecular weight.

9. The composition of claim 8 wherein the mixture comprises a polycarbonate with weight average molecular weight between about 18,000 and about 23,000 g/mol in combination with a polycarbonate with weight average molecular weight between about 28,000 and about 36,000 g/mol, relative to polystyrene standards.

10. The composition of claim 1 wherein the polycarbonate is present in an amount in a range of between about 5 wt.% and about 95 wt.%, based on the weight of the entire composition.

11. The composition of claim 1, wherein the additional thermoplastic resin is selected from the group consisting of (meth)acrylate homopolymers and copolymers, methyl methacrylate-butyl acrylate copolymer, methyl methacrylate-ethyl acrylate copolymer, styrene and alkylstyrene homopolymers and copolymers, styrene-acrylonitrile (SAN) copolymer, alpha-methylstyrene-acrylonitrile (AMSAN) copolymer, methyl methacrylate-styrene-acrylonitrile (MMA-SAN) terpolymer, methyl methacrylate/alpha-methylstyrene/acrylonitrile (MMA-AMSAN) terpolymer, and mixtures thereof.

12. The composition of claim 11, wherein the additional thermoplastic resin is present in the composition in a range of between about 1 wt.% and about 80 wt.%, based on the weight of the entire composition.

5 13. The composition of claim 1, wherein the elastomeric phase comprises a polymer having structural units derived from at least one (C₁-C₁₂)alkyl(meth)acrylate monomer.

14. The composition of claim 13, wherein the alkyl(meth)acrylate monomer is butyl acrylate.

10 15. The composition of claim 1, wherein the elastomeric phase further comprises structural units derived from at least one polyethylenically unsaturated monomer.

15 16. The composition of claim 15, wherein the polyethylenically unsaturated monomer is selected from the group consisting of butylene diacrylate, divinyl benzene, butene diol dimethacrylate, trimethylolpropane tri(meth)acrylate, allyl methacrylate, diallyl methacrylate, diallyl maleate, diallyl fumarate, diallyl phthalate, triallyl methacrylate, triallylisocyanurate, triallylcyanurate, the acrylate of tricyclodecenyloalcohol and mixtures thereof.

17. The composition of claim 1, wherein the elastomeric phase comprises about 10 to about 80 percent by weight of the rubber modified thermoplastic resin.

20 18. The composition of claim 1, wherein the elastomeric phase comprises about 35 to about 80 percent by weight of the rubber modified thermoplastic resin.

25 19. The composition of claim 1, wherein the elastomeric phase initially comprises particles selected from the group consisting of a mixture of particles sizes with at least two number average particle size distributions and a broad size distribution having particles ranging in size from about 50nm to about 1000nm.

20. The composition of claim 19, wherein the two number average particle size distributions are each in a range of between about 80nm and about 500nm.

30 21. The composition of claim 1, wherein at least about 5 weight % to about 90 weight % of rigid thermoplastic phase is chemically grafted to the elastomeric phase, based on the total amount of rigid thermoplastic phase in the composition.

22. The composition of claim 1, wherein the rigid thermoplastic phase comprises structural units derived from styrene, acrylonitrile and methyl methacrylate; or alpha-methyl styrene, acrylonitrile and methyl methacrylate; or styrene, alpha-methyl styrene, acrylonitrile and methyl methacrylate.

5 23. The composition of claim 22, wherein the wt./wt. ratio of styrene, alpha-methyl styrene or mixture thereof to acrylonitrile is in a range of between about 1.5:1 and about 4:1.

10 24. The composition of claim 22, wherein the wt./wt. ratio of styrene, alpha-methyl styrene or mixture thereof to acrylonitrile is in a range of between about 2:1 and about 3:1.

25. The composition of claim 22, wherein the wt./wt. ratio of styrene, alpha-methyl styrene or mixture thereof to acrylonitrile is about 2.6:1.

15 26. The composition of claim 22, wherein the wt./wt. ratio of methyl methacrylate to the total of vinyl aromatic monomer and monoethylenically unsaturated nitrile monomer is in a range of between about 4:1 and about 1:4.

27. The composition of claim 1, wherein the amount of (C₁-C₁₂)alkyl- or aryl-(meth)acrylate monomer employed for grafting to rubber substrate is in a range of between about 70 wt.% and about 2 wt.%, based on the total weight of all monomers employed for grafting.

20 28. The composition of claim 1, further comprising at least one additive selected from the group consisting of colorants, dyes, pigments, lubricants, stabilizers, mold release agents, fillers and mixtures thereof.

25 29. A composition comprising (i) between about 5 wt.% and about 95 wt.%, based on the weight of the entire composition, of at least one polycarbonate comprising structural units derived from bisphenol A; (ii) between about 1 wt.% and about 80 wt.%, based on the weight of the entire composition, of at least one additional thermoplastic resin different from polycarbonate selected from the group consisting of (meth)acrylate homopolymers and copolymers, methyl methacrylate-butyl acrylate copolymer, methyl methacrylate-ethyl acrylate copolymer, styrene and alkylstyrene homopolymers and copolymers, styrene-acrylonitrile (SAN) copolymer, alpha-methylstyrene-acrylonitrile (AMSAN) copolymer, methyl methacrylate-styrene-acrylonitrile (MMA-SAN) terpolymer, methyl methacrylate/alpha-

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methylstyrene/acrylonitrile (MMA-AMSAN) terpolymer, and mixtures thereof; and
(iii) at least one rubber modified thermoplastic resin comprising a discontinuous
elastomeric phase dispersed in a rigid thermoplastic phase, wherein at least a portion
of the rigid thermoplastic phase is grafted to the elastomeric phase, and

5 wherein the elastomeric phase comprises structural units derived from butyl
acrylate; the rigid thermoplastic phase comprises structural units derived from styrene,
acrylonitrile and methyl methacrylate; or from alpha-methyl styrene, acrylonitrile and
methyl methacrylate; or from styrene, alpha-methyl styrene, acrylonitrile and methyl
methacrylate; and

10 wherein the wt./wt. ratio of styrene, alpha-methyl styrene or mixture thereof to
acrylonitrile is in a range of between about 1.5:1 and about 4:1; and wt./wt. ratio of
methyl methacrylate to the total of other monomers is in a range of between about 4:1
and about 1:4.

15 30. The composition of claim 29, further comprising at least one additive
selected from the group consisting of colorants, dyes, pigments, lubricants, stabilizers,
mold release agents, fillers and mixtures thereof.

20 31. A composition comprising (i) at least one polycarbonate comprising
structural units derived from bisphenol A; (ii) at least one additional thermoplastic
resin different from polycarbonate selected from the group consisting of
(meth)acrylate homopolymers and copolymers, methyl methacrylate-butyl acrylate
copolymer, methyl methacrylate-ethyl acrylate copolymer, styrene and alkylstyrene
homopolymers and copolymers, styrene-acrylonitrile (SAN) copolymer, alpha-
methylstyrene-acrylonitrile (AMSAN) copolymer, methyl methacrylate-styrene-
acrylonitrile (MMA-SAN) terpolymer, methyl methacrylate/alpha-
25 methylstyrene/acrylonitrile (MMA-AMSAN) terpolymer, and mixtures thereof; and
(iii) at least one rubber modified thermoplastic resin comprising a discontinuous
elastomeric phase dispersed in a rigid thermoplastic phase, wherein at least a portion
of the rigid thermoplastic phase is grafted to the elastomeric phase, and wherein the
elastomeric phase comprises a polymer having structural units derived from at least
30 one (C₁-C₁₂)-alkyl(meth)acrylate monomer, and wherein the rubber modified
thermoplastic resin is prepared by a method comprising the steps of:

35 (a) polymerizing a mixture of monomers in a first stage in the presence of the
elastomeric phase, wherein at least one monomer is selected from the group consisting
of vinyl aromatic monomers, at least one of monomer is selected from the group
consisting of monoethylenically unsaturated nitrile monomers, and optionally at least

one monomer is selected from the group consisting of (C₁-C₁₂)alkyl(meth)acrylate monomers, followed by

(b) polymerizing one or more monomers in at least one subsequent stage in the presence of the elastomeric phase from (a), wherein the one or more monomers comprise at least one monomer selected from the group consisting of vinyl aromatic monomers, at least one of monomer selected from the group consisting of monoethylenically unsaturated nitrile monomers, and optionally at least one monomer selected from the group consisting of (C₁-C₁₂)alkyl(meth)acrylate monomers;

wherein the monomer selected from the group consisting of (C₁-C₁₂)alkyl-(meth)acrylate monomers is present in at least one of steps (a) and (b).

32. The composition of claim 31, wherein the polycarbonate is present in a range of between about 5 wt.% and about 95 wt.%, based on the weight of the entire composition.

33. The composition of claim 31, wherein the alkyl(meth)acrylate monomer of the elastomeric phase comprises butyl acrylate.

34. The composition of claim 31, wherein the alkyl(meth)acrylate monomer polymerized in the presence of the elastomeric phase is present in step (b).

35. The composition of claim 31, wherein the amount of alkyl-(meth)acrylate monomer employed for grafting to rubber substrate is in a range of between about 70 wt.% and about 2 wt.%, based on the total weight of all monomers employed for grafting.

36. The composition of claim 31, wherein the alkyl(meth)acrylate monomer polymerized in the presence of the elastomeric phase is methyl methacrylate.

37. The composition of claim 31, wherein the additional thermoplastic resin is present in the composition in a range of between about 1 wt.% and about 80 wt.%, based on the weight of the entire composition.

38. The composition of claim 31, further comprising at least one additive selected from the group consisting of colorants, dyes, pigments, lubricants, stabilizers, mold release agents, fillers and mixtures thereof.

39. An article comprising the composition of claim 1.

40. An article comprising the composition of claim 29.
41. An article comprising the composition of claim 31.
42. A method for making a composition comprising (i) at least one polycarbonate; (ii) optionally, at least one additional thermoplastic resin different from polycarbonate; and (iii) at least one rubber modified thermoplastic resin comprising a discontinuous elastomeric phase dispersed in a rigid thermoplastic phase, wherein at least a portion of the rigid thermoplastic phase is grafted to the elastomeric phase, and wherein the rigid thermoplastic phase comprises structural units derived from at least one vinyl aromatic monomer, at least one monoethylenically unsaturated nitrile monomer, and at least one monomer selected from the group consisting of (C₁-C₁₂)alkyl- and aryl-(meth)acrylate monomers, wherein the method comprises the step of combining the components under conditions of intimate mixing.
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43. A process to improve the resistance to color formation or loss of gloss in articles manufactured from a thermoplastic composition comprising (i) at least one polycarbonate; (ii) optionally, at least one additional thermoplastic resin different from polycarbonate; and (iii) at least one rubber modified thermoplastic resin comprising a discontinuous elastomeric phase dispersed in a rigid thermoplastic phase, wherein at least a portion of the rigid thermoplastic phase is grafted to the elastomeric phase, and wherein the rigid thermoplastic phase comprises structural units derived from at least one vinyl aromatic monomer and at least one monoethylenically unsaturated nitrile monomer, which process comprises including in the rigid thermoplastic phase structural units derived from at least one monomer selected from the group consisting of (C₁-C₁₂)alkyl- and aryl-(meth)acrylate monomers.
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